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United States General Accounting Office

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4/18/00  
**Chicago Office**

**Suite 700**

**200 W. Adams Street  
Chicago, IL 60606-5219**

April 18, 2000

Mr. Brad Bradley  
Remedial Project Manager  
Environmental Protection Agency  
77 West Jackson Blvd., 6<sup>th</sup> Fl  
Chicago, IL 60604

Dear Mr. Bradley:

As promised, please find enclosed 2 copies of our report of costs at Superfund sites, including NL Industries in Granite City. Would you please see that Sheri gets a copy. I apologize for the delay in getting these copies to you. Once again I want to thank you both for all the assistance provided during my audit.

Sincerely yours,

Willie Bailey  
Senior Auditor

Enclosure(s) 2

EPA Region 6 Records Ctr.



257848

# Summary of Remedial Action Work at the NL Industries Superfund Site

## Background

The NL Industries Superfund site is a 16-acre industrial facility located in Granite City, Illinois. It operated as a lead-smelting facility from about 1903 to 1983, during which time it generated an on-site pile of lead-contaminated slag and debris from a battery casing breakup operation. The industrial activities caused extensive lead contamination in Granite City and several surrounding communities. First, airborne emissions from the smelting operation contaminated an extensive area to the south and west of the facility, and second, lead-contaminated material from the crushed battery casings were sold off-site and used to fill low-lying areas and alleys—known as remote fill areas—throughout the surrounding communities. Lead contamination from the site was evident over an area of about 100 blocks, affecting an estimated 1,600 residences. The remote fill activities affected about 100 locations, including residences and alleys. The industrial site also had significant contamination, including piles of soil and debris weighing about 250,000 tons and about 35 drums of contaminated solid waste from the smelting operations. Because of concerns over lead contamination in the Granite City area and documented risks to public health from exposure to high levels of lead, the state of Illinois, in 1982, denied an application to continue operating the smelter, and all operations at the site were discontinued in 1983. A blood study indicated that 16 percent of the children in the surrounding areas, and 25 percent of those living nearest the site, had blood lead levels above 10 micrograms per deciliter.<sup>1</sup>

In 1985, EPA directed NL Industries to assess the site's contamination and identify possible remedies. Through this investigation, NL Industries identified seven potential cleanup remedies for the site, including a \$475,000 no action remedy, which involved monitoring air quality and groundwater and placing restrictions on the site's use. Five of the remaining remedies involved removing drums off-site, excavating lead-contaminated soil and battery chips from residential properties and alleys and placing them on the industrial site's slag pile, capping the pile, moving some of the most contaminated soil to an approved landfill, and installing deep groundwater-monitoring wells. The estimated costs of these remedies ranged from about \$6 million to about \$67 million. The major difference among them was the type of cap that would have been used to cover the site. The seventh and most expensive remedy would have moved all of the

<sup>1</sup>According to the Illinois Department of Health, any blood level above 10 micrograms suggests exposure that is greater than normal and requires action. A level of 30 micrograms indicates blood poisoning.

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**Appendix I**  
**Summary of Remedial Action Work at the**  
**Newmark Superfund Site**

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cleaning up groundwater at the site. According to EPA officials, three areas are the most likely sources. These are (1) Camp Ono, a former U.S. Army base that lies to the north and west of the two plumes;<sup>6</sup> (2) the Cajon Landfill, a county-owned facility that lies north of Camp Ono; and (3) the site of the former San Bernardino Airport, which lies farther south, within the Newmark plume. According to EPA officials, there is no known financially viable entity associated with the former airport to cover cleanup costs if it is found to be one of the sources.

Although EPA has not named the U.S. Army as a potentially responsible party liable for response costs, the Army is currently conducting an investigation of the source operable unit, under an agreement with EPA. This investigation consists of testing soil and groundwater at locations at Camp Ono where solvents are most likely to have been used. Army officials told us that although it is possible that the Army is partly responsible for the contamination, the Army's responsibility has not been proved.

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<sup>6</sup>In a separate action, the city of San Bernardino and the state of California have filed a lawsuit against the U.S. Army in an effort to recover the costs of past efforts to address the contamination.

contaminated soil to a suitable landfill. For all of the remedies requiring soil cleanup, the potentially responsible parties (PRP) proposed that soil from both the residential properties and the industrial site be cleaned up to a standard of 1,000 parts per million (ppm) of lead. They estimated that about 250 residential properties would require remediation under this standard. In addition to these alternatives, EPA asked NL Industries to develop an alternative using a 500-ppm cleanup standard, but NL Industries declined to do so. Subsequently, EPA developed such an alternative. EPA's alternative was similar to one of the remedies that would have consolidated and capped contaminated material at the industrial site, but it applied a standard of 500 ppm to the residential areas.

In March 1990, EPA issued a record of decision selecting the alternative it had developed, thus applying the 500-ppm standard to the residential areas. The estimated cost of this remedy was \$30 million, compared with \$7 million for a comparable remedy using the 1,000-ppm standard, because the estimated number of properties to be cleaned increased from 250 to about 1,300. The responsible parties considered this standard more stringent than necessary to protect public health and too costly. Even though EPA issued a unilateral administrative order<sup>2</sup> directing the responsible parties to implement the selected remedy, they did not cooperate. In addition, in response to information disclosed during the remedy design, EPA later amended the remedy to protect groundwater. EPA determined that the contaminated soil and battery casings excavated from residential properties and alleys would be disposed of off-site in an approved landfill, instead of being added to the waste piles at the industrial site. This change, as well as other factors, such as larger-than-expected numbers of remote fill sites, increased the estimated cost of the remedial action from \$30 million to about \$55 million.

Because the responsible parties refused to comply with EPA's administrative order, EPA, in February 1993, entered into an interagency agreement with the U.S. Army Corps of Engineers (the Corps) to design and implement the remedy. The Corps, in turn, contracted with OHM Remediation Services Corporation (OHM) to conduct the remedial work under a cost-plus-fixed-fee contract. Under this arrangement, EPA, through the Corps, paid the contractor for all costs incurred, as well as a fixed fee.

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<sup>2</sup>A unilateral administrative order is an enforcement tool EPA uses to compel responsible parties to perform and pay for cleanup when negotiations fail.

Appendix II  
Summary of Remedial Action Work at the NL  
Industries Superfund Site

Table 3 summarizes major events in EPA's cleanup effort.

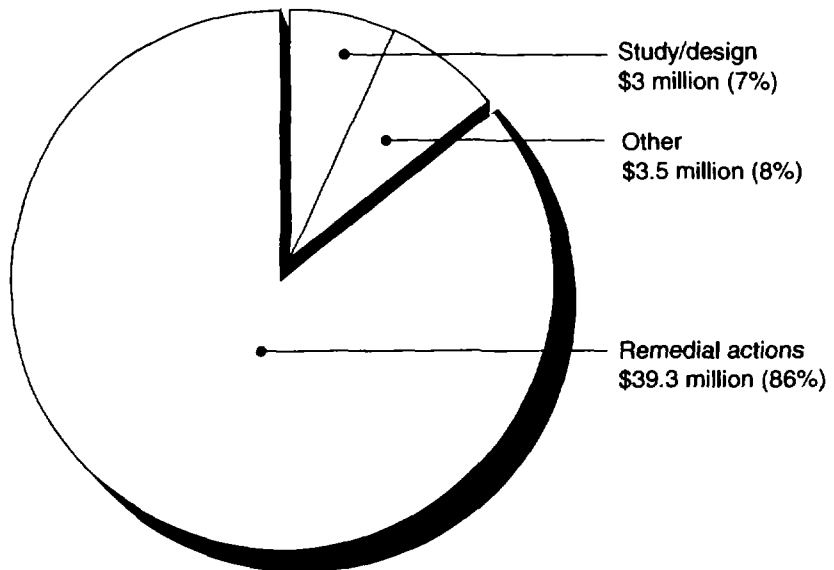
**Table 3: Major Events in the Cleanup of the NL Industries Site**

Date	Event
May 1985	NL Industries officials sign a consent order to conduct a remedial investigation.
June 1986	EPA places the NL Industries site on the National Priorities List.
Jan. 1990	NL Industries completes a remedial investigation/feasibility study.
Mar. 1990	EPA issues a record of decision specifying the selected remedy.
Nov. 1991	EPA issues a unilateral administrative order directing the responsible parties to implement the remedy.
Feb. 1993	EPA signs an agreement with the Corps to design and implement the remedy.
Apr. 1993	The Corps starts residential cleanup action.
Apr. 1994	The responsible parties seek a court order to halt EPA's cleanup activity.
July 1998	The responsible parties agree to take over the cleanup and enter into cost recovery negotiations.
Sept. 2000	All cleanup activity at the NL Industries site is scheduled for completion.

## Cleanup Costs and Major Components

According to EPA's financial management system, EPA has spent about \$45.8 million to clean up the NL Industries site. Of this amount, the largest portion, about \$39.3 million (86 percent), went directly to the contractors that implemented the cleanup remedy. Figure 4 illustrates the costs associated with the site's cleanup, by its major components.

**Figure 4: Federal Expenditures at the NL Industries Superfund Site**



Note: Removal costs, which are less than 1 percent of EPA's total spending, are included with remedial action costs. Percentages do not add up to 100 due to rounding.

Source: GAO's analysis of EPA data.

Our analysis of the prime contractor's financial data revealed that of the \$39.3 million in remedial action costs, \$34.6 million (88 percent) went to the remedial action contractors for costs generally associated with physical cleanup activities. Of the \$34.6 million, about \$2 million (6 percent) went to subcontractors that performed various on-site work, and the prime contractor, OHM, retained about \$32.6 million (94.2 percent) for the physical cleanup activities it performed. The other \$4.7 million in remedial action costs went for overhead and administrative support activities, such as travel, insurance, and laboratory services.

The cleanup of the NL Industries site was separated into two distinct phases: (1) a rapid response activity—comparable to a removal action—managed by the Corps' Omaha office and (2) a longer-term remedial action managed by the Corps' Chicago office. OHM performed the cleanup activities for both phases. For the rapid response activity, the contractor designed the remedy, moved drums of contaminated material off-site, and cleaned up about 109 residential properties and/or alleyways that required immediate attention. The costs of individual rapid response components could not be determined because the Corps' records did not provide this

level of detail. However, the total amount paid for these rapid response efforts was about \$11 million. For the remedial action, OHM cleaned up another 960 residential lots and alleyways, at a cost of about \$28 million. In general, the contractor was directed to identify the extent of contamination at each property and to eliminate exposure to the contamination. The scope of work was determined property by property. According to a Corps official, the costs to sample, excavate, and backfill a residential property ranged from about \$1,400 to about \$69,900 and averaged about \$24,000 per property. As discussed below, in 1998 some of the responsible parties reached a settlement with EPA under which they agreed to take over the cleanup. At that time, the Corps became responsible for overseeing the parties' work for EPA.

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## Significant Cost Changes and Other Remedy Implementation Issues

We were unable to assess cost changes at this site because uncertainties about the scope of cleanup needed prevented full cost estimates from being developed at the start of the work. Instead, the prime contractor was directed to determine if residential properties and alleyways in an area were contaminated and to excavate and remove any contaminants to whatever depth was necessary, as well as to implement the groundwater and industrial site remedies. Therefore, it was impossible to accurately estimate the cost to remediate a property until the work was under way. The Corps' estimates of costs were based on worst-case scenarios.

The Corps did estimate the costs of capping the site, about \$6 million, and of installing the groundwater-monitoring wells, about \$3 million. However, these tasks had not been finished at the time of our review and have now been taken over by the responsible parties.

Under its agreement with EPA, the Corps was responsible for overseeing the performance of the remedial action contractors. According to Corps officials, the prime contractor did a good job of staying on schedule and received payments as planned.

## EPA and Responsible Parties Disagree Over Lead Cleanup Standards

Both the responsible parties and Granite City officials opposed using the 500-ppm cleanup standard for lead in soil. About a year after the residential cleanup actions started, Granite City officials and the responsible parties sought a court order halting EPA's cleanup efforts. They believed the 500-ppm standard imposed by EPA was unnecessarily expensive. In August 1994, in accordance with a negotiated agreement, EPA suspended residential cleanup actions and reconsidered the standard. To do so, EPA

used a quantitative model that incorporated site-specific data to assess the risk posed by lead contamination. After about a year's delay, EPA reaffirmed its decision to use the 500-ppm standard, and the court allowed the cleanup work to resume. In 1996, a federal district court rejected an attempt by Granite City officials and some responsible parties to halt the cleanup.

While the court decision was pending during the early residential excavation and removal work, Granite City officials refused to give the Corps' cleanup contractor access to city-owned easements—strips of land between the streets and sidewalks. By the time the city gave the contractor access, the soil had been excavated from about 325 residential yards but not from the associated easements. The Corps estimates that EPA had to spend about \$650,000 for the contractor to return to excavate the easements.<sup>3</sup> In addition, an EPA official said the litigation helped extend the cleanup period from 2.5 years, as initially estimated, to 7 years, thereby increasing EPA's and the Department of Justice's overhead costs.

EPA's 500-ppm standard was based on interim guidance, in effect at the time the remedy was chosen at the site, establishing a cleanup level for lead in soil within residential areas. This guidance referred to a range of 500 to 1,000 ppm. While the guidance suggested that blood lead levels, especially in children, appear to be affected by lead concentrations in soil that range from 500 to 1,000 ppm, it did not specifically recommend that lead-contaminated soil be cleaned up to a standard of 500 ppm. Instead, it stated that site-specific factors should be included in decisions to determine the actual cleanup level. According to the responsible parties, EPA did not provide definitive evidence to show that the 500-ppm standard would be more protective of human health than the 1,000-ppm standard. According to EPA, the 500-ppm level was consistent with the quantitative model it uses to determine the safe level of lead in soil. A less stringent cleanup level would not, according to EPA's best scientific information, have been adequate to protect public health. An EPA official also said that if the less stringent standard had been applied and found inadequate to protect public health, the cleanup costs would have been higher because of the need to mobilize a second cleanup.

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<sup>3</sup>While there would have been some cost to remediate these easements during the earlier work, EPA officials believe a significant portion of these funds could have been saved.



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## Current Status of Cleanup

Effective July 1998, six of the major responsible parties that had generated the contaminated waste agreed to take joint responsibility for cleaning up the lead contamination at the industrial site, as well as for completing the remedial actions that were under way at the residential properties. These responsible parties have contracted with another firm to complete the cleanup actions initiated by the Corps and OHM. According to November 1999 cleanup figures, over 1,540 residential properties have been excavated, backfilled, and resodded—about 836 by the Corps' contractor and about 708 by the responsible parties. In addition, another 125 residential properties and alleyways were excavated because they were contaminated with battery chip debris.

As of December 1999, substantially all of the cleanup activities specified in the record of decision were completed, except for the groundwater remedy. The total cleanup costs for the site are estimated to be about \$63.5 million. The remainder of these costs will be picked up by the responsible parties.

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## Enforcement and Cost Recovery Issues

NL Industries officials did not join six other responsible parties in their decision to settle with EPA and complete the site's cleanup actions. EPA has reached a verbal agreement with NL Industries to enter into a consent decree, but the agreement has not been finalized. The other six responsible parties agreed in July 1998 to complete the cleanup actions (then estimated to cost about \$21 million), reimburse EPA about \$9 million of its already expended funds, and pay about \$400,000 in penalties for failing to comply with the unilateral administrative order, as well as pay about \$2 million to abate lead-based paint problems in the cleanup area.